PROPORTIONAL DRIVE SUPPLY WITH DIVERSION CONTROL

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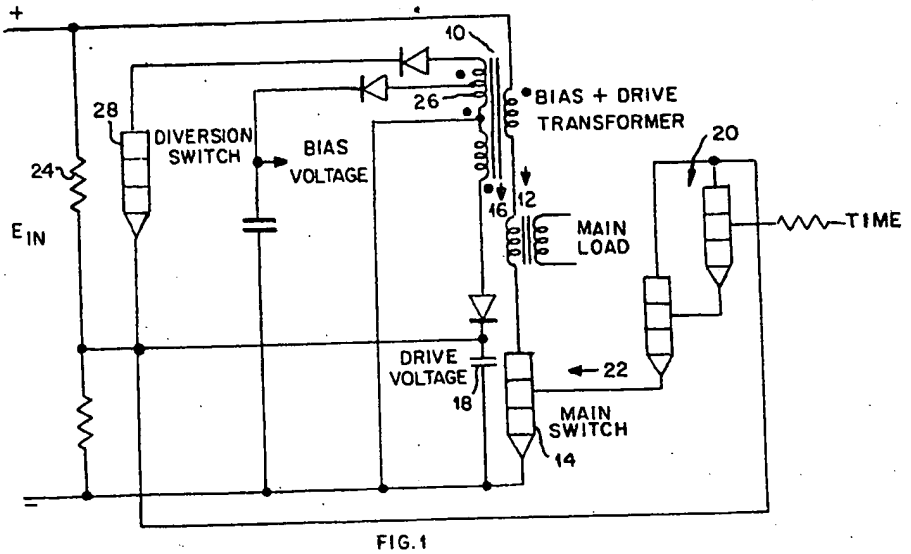

FIG. 1

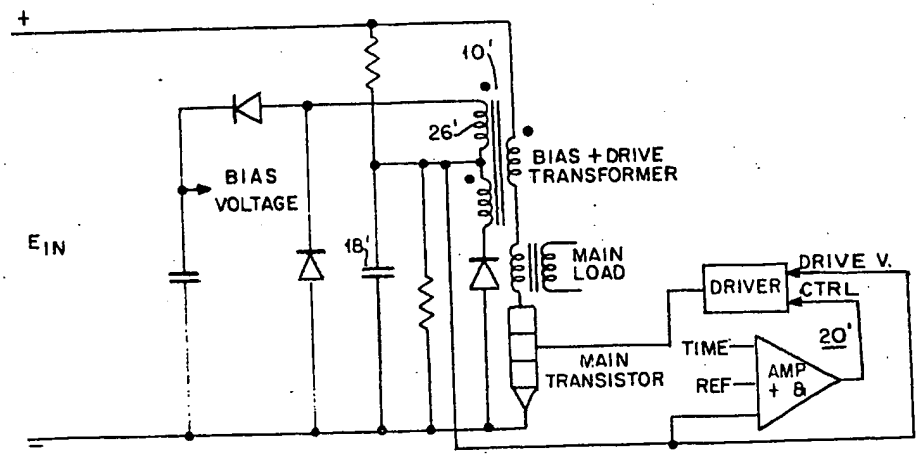

FIG. 2

Power switching transistors, such as those utilized in transistor switching regulators, are switched between fully on and fully off conditions under substantial load and collector voltage conditions. Adequate base drive is required to insure that the dissipation within the transistor during on time is a minimum, and yet it is also important that the transistor not be driven into deep saturation whereby its turn-off characteristics would be adversely affected.

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Where voltage sources are utilized for the base drive, clamp circuits may be required to prevent deep saturation, and, even if the voltage source is regenerative, it is not inherently related to the base drive requirement, the latter being a current which is a function of the load current.

In the circuit of Fig. 1, a current transformer 10 is placed in series with the main load current 12, through the switching transistor 14, to provide a current 16 which is directly proportional to 12. Current 16 is used to maintain a charge on a capacitor 18, and 18 provides energy through voltage responsive current control 20 to the base of 14. Control 20 also introduces the on-off TIME control signal for 14, and may be a simple Darlington circuit. Since the control 20 responds to the voltage on capacitor 18, and the voltage on capacitor 18 is maintained by current 16, which is proportional to 12, the base drive current 22 is automatically accommodated to the load current 12 requirement imposed on the switching transistor 14.

Initially, capacitor 18 is charged through a high impedance or other start-up path 24 to a basic potential which is maintained and adjusted by the current 16 flowing to 18 and the current 22 flowing from 18 to the switching transistor base.

Conveniently, reset energy from transformer 10 can supply bias for the regulator. For this purpose, a flyback winding 26 is added to 10, and a simple regulator 28 is provided to trim the resulting voltage to the desired bias voltage. A diversion switch, as described on pages 4909-4910 of this issue, can be used for this purpose. This switch 28 is connected to capacitor 18 to offset the effect of magnetizing current on the original current transformer operation.

Fig. 2 shows a modification in which a control circuit 20', including a reference and a time-gated comparator, is employed in lieu of the Darlington switch 20 shown in Fig. 1. In this case, the voltage across capacitor 18' and thus across current transformer 10' will be more accurately fixed, and the bias is taken from a non-flyback secondary winding 26' on the current transformer. Since winding 26' tracks the voltage across capacitor 18', which is accurately fixed by 20', a separate regulator for the bias is not needed.

In each case, the capacitor 18 or 18' provides start-up drive and a load-tracking continuing drive for the main switching transistor, and the current transformer 10 or 10' provides a quickly available, regulated bias supply.